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[54] DEPOSITORY FOR IMPRINTING AND
STORING ENVELOPES CONTAINING
PAPER CURRENCY AND/OR COINS

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232/44

[51] Int. CL..... E05g

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232/44; 109/58, 66; 194/DIG. 9 B, DIG. 16,
194/18, 4 R, 2; 101/66

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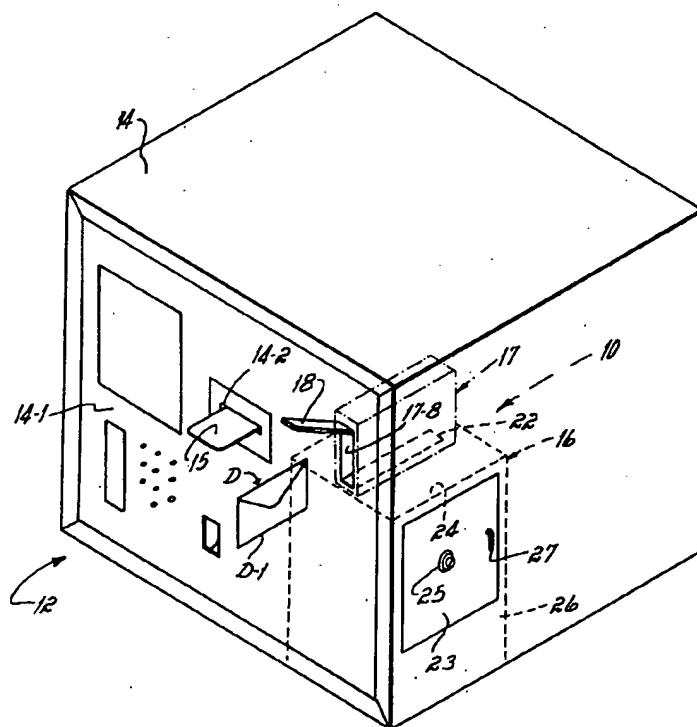
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[57] ABSTRACT

A depository for imprinting with the date, deposit number, etc. an envelope containing paper currency and/or coins and thereafter storing the imprinted envelope, including a combined envelope receptacle and transfer unit for receiving and temporarily storing in a vertical disposition a deposited envelope and while so vertically stored imprinting it with the date and deposit number, and a vault provided with a slot in the top surface which, when the combined receptacle and transfer unit is mounted atop the vault, underlies an open bottom provided in the receptacle and transfer unit. The combined receptacle and transfer unit is provided with a door through which a deposited article can be inserted into the unit for printing, while vertically disposed, and a trap door overlying the slot in the vault top for allowing the deposited article, following printing, to pass under the force of gravity into the vault when the trap door is moved to its open position. The printer within the combined receptacle and transfer unit is located a sufficient distance above the open floor of the unit to insure that any coins in the deposit envelope will, under the force of gravity, fall into the bottom of the envelope and thereby be located below the printer such that they do not interfere with the printing operation.

2 Claims, 8 Drawing Figures



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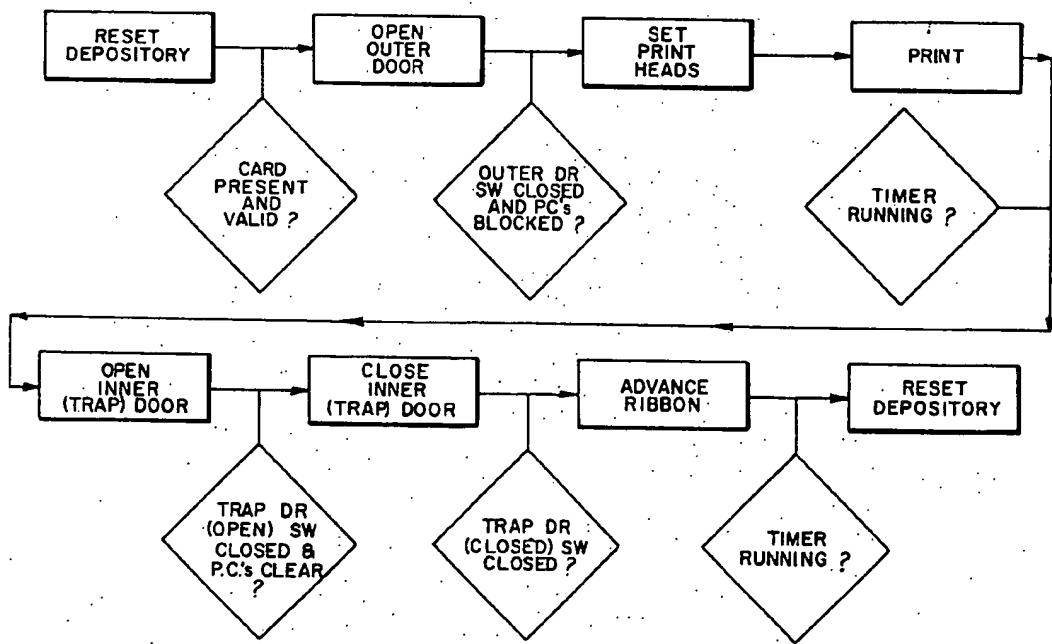
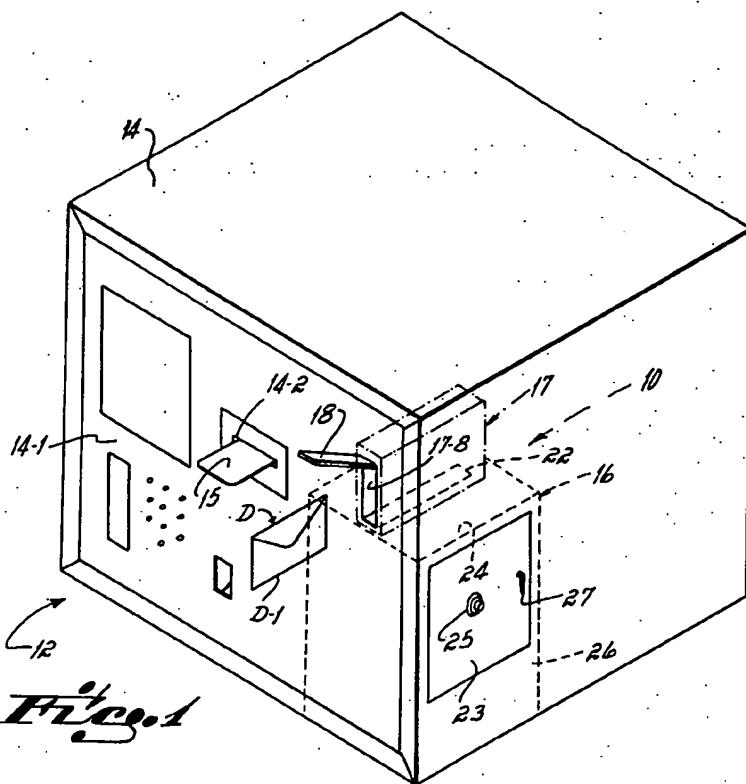
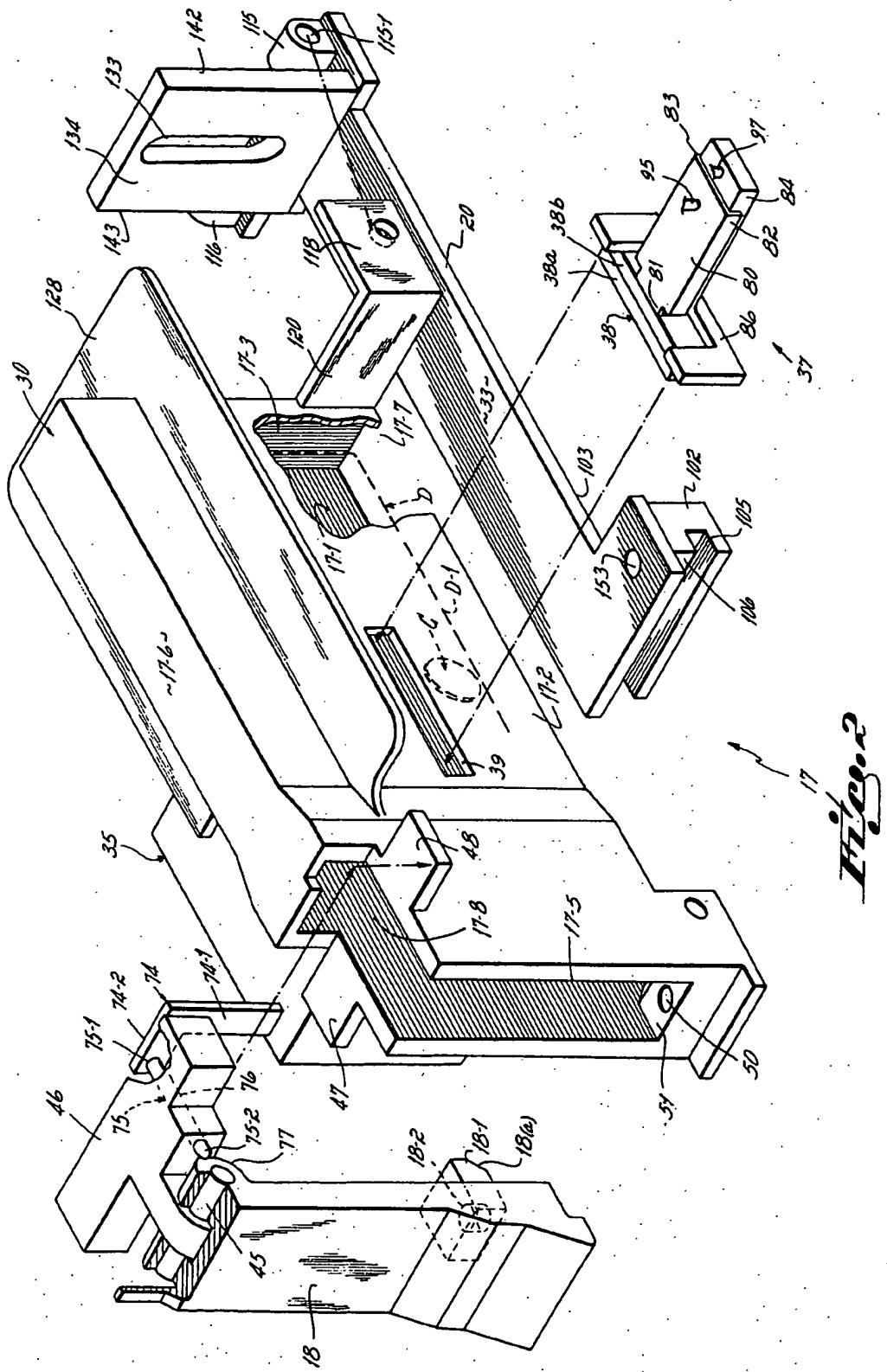


FIG. 2

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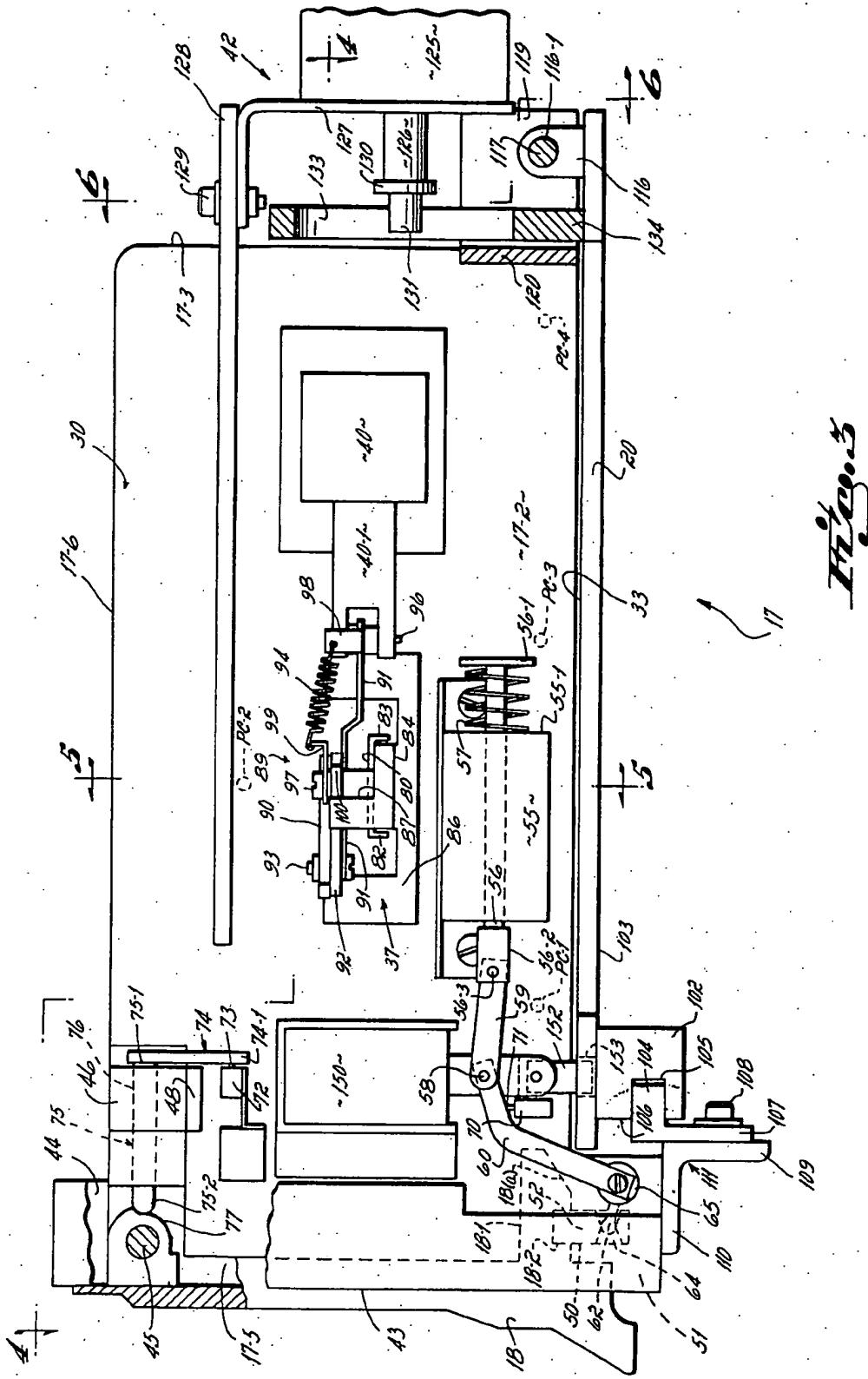
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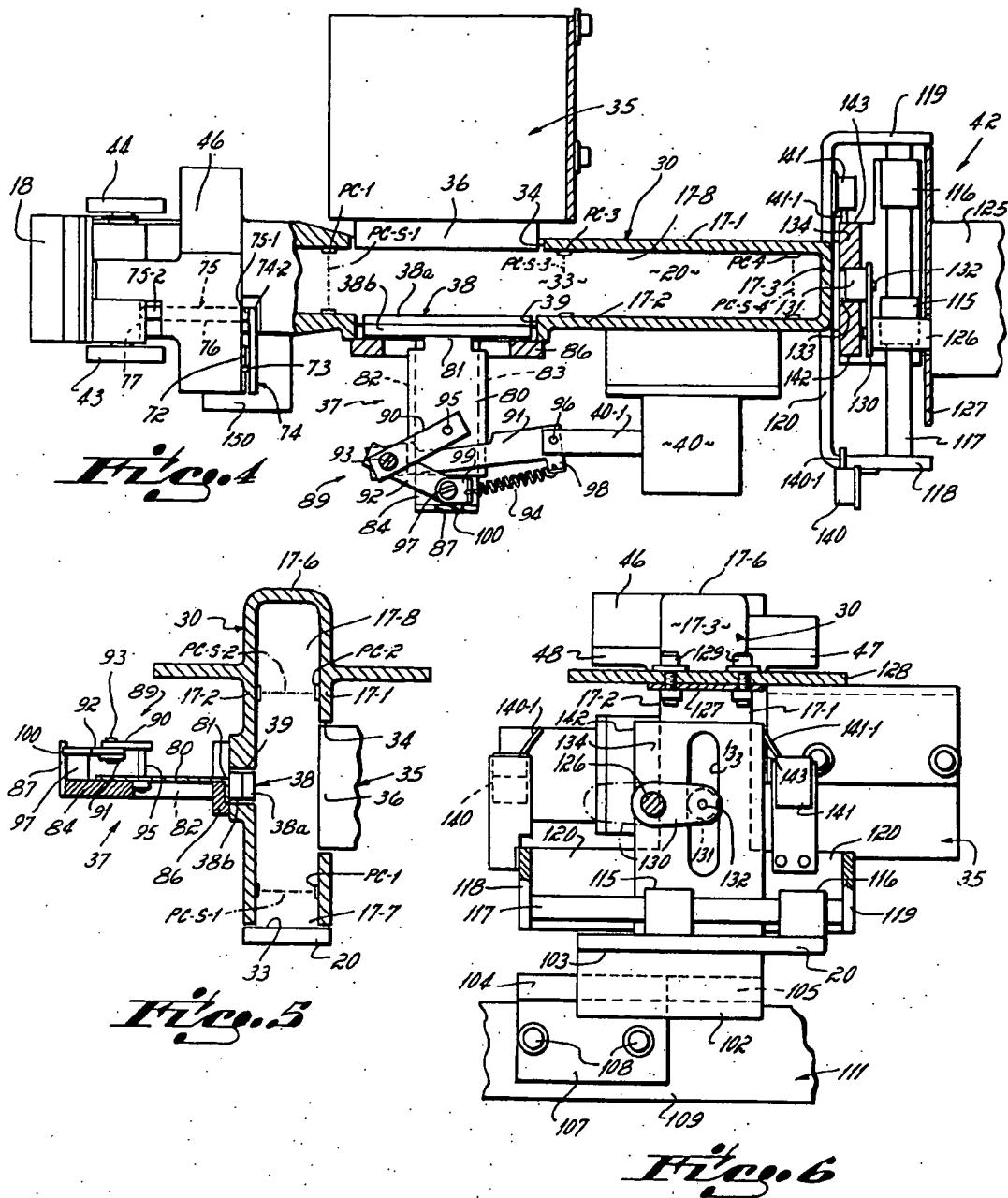
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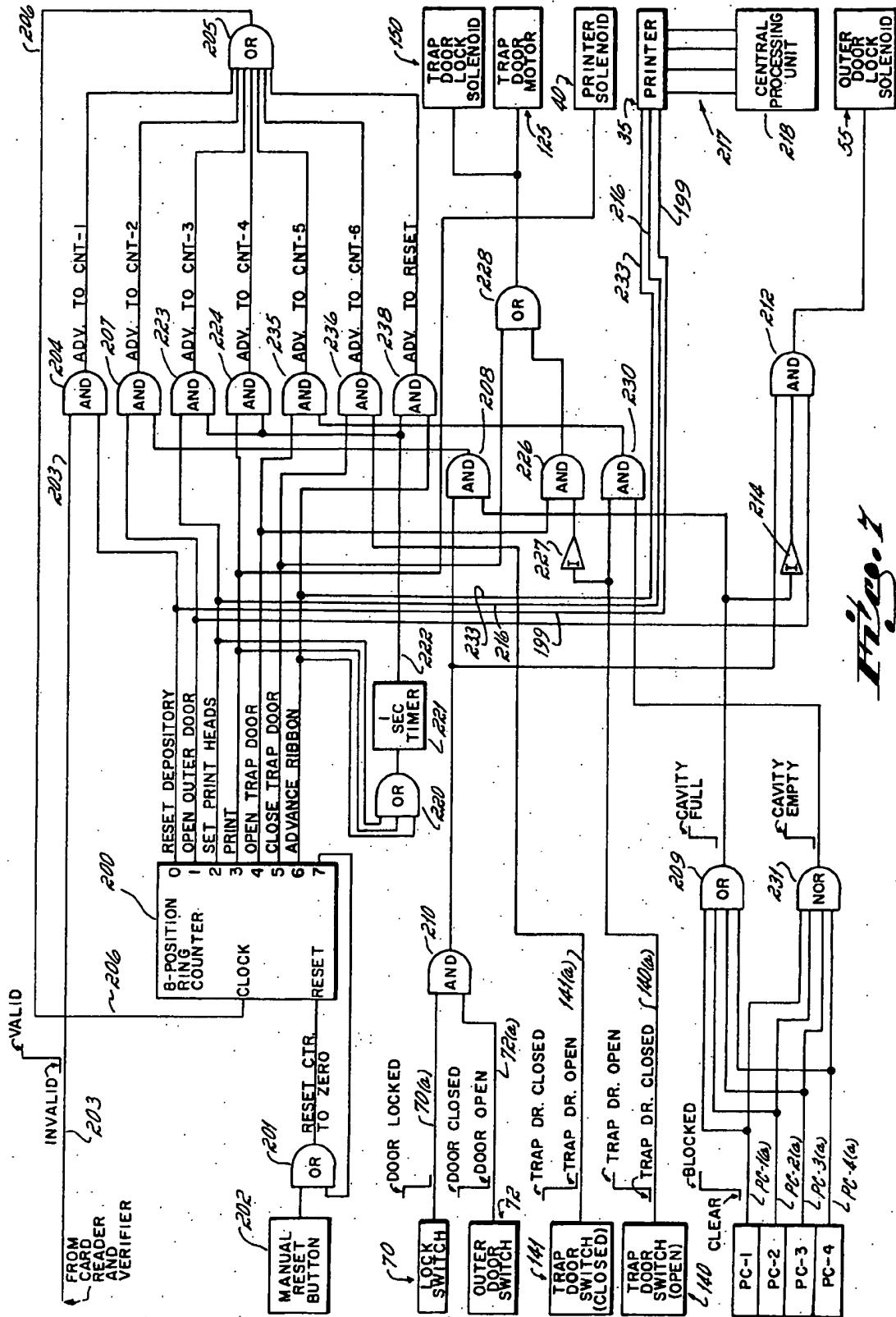
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**DEPOSITORY FOR IMPRINTING AND STORING
ENVELOPES CONTAINING PAPER CURRENCY
AND/OR COINS**

This invention relates to a depository for valuables, such as money in the form of paper currency and/or coins, and more particularly to bank depositories for envelopes containing coins which imprint on the deposited envelope reference information such as the date, deposit number, or the like.

Bank depositories of the type designed to receive and store valuables, particularly envelopes containing cash in the form of paper currency and coins, typically include a vault, which is nothing more than an armored container, and some form of receptacle and transfer device into which the deposited envelope is inserted by the bank customer for subsequent transfer to the vault via a suitably located transfer slot therein. The use of a receptacle and transfer device in association with a vault prevents the bank customer depositing the item from having direct access to the vault via the transfer slot provided therein through which the deposited item passes in the course of being input to the vault. Typically, the receptacle and transfer unit has a first or insertion door which, when opened, permits the deposited item to be inserted into the receptacle and transfer unit, and a second or trap door covering the vault transfer slot which is closed to deny the customer access to the vault when the insertion door is open. The trap door opens when the insertion door is closed following insertion of the deposit, permitting the deposited item to pass into the vault via the transfer slot. The customer is denied access to the vault during this transfer time by the insertion door which, as noted, is closed when the trap door is open.

It has been found desirable to imprint on deposited items the date of the deposit and/or a deposit number to distinguish one deposit from another. The depositing bank customer is usually provided a receipt by the depository which also bears an imprint of the date and deposit number as a record of the deposit. In systems of the type designed to imprint the deposit with the date and/or deposit number, a problem arises when the item deposited, such as an envelope, contains money in the form of coins. Specifically, the coins, since typically inserted in the envelope in random fashion, cause the deposited envelope to have a non-uniform thickness. Should the envelope, in the area in which the printing element contacts it to form the imprint, be non-uniform in thickness, improper coaction, particularly non-uniformity of contact, between the print head and the print receiving surface of the envelope may result, causing the imprint of the date and deposit number to be illegible or otherwise unsatisfactory.

It has been an objective of this invention to provide a depository for envelopes containing money, particularly coins, which provides a uniformly high quality imprint of a deposit number, date or the like on the envelope. This objective has been accomplished in accordance with certain of the principles of this invention by providing, in combination with a vault, a combined receptacle and transfer unit which is configured to receive a coin-containing deposit envelope in only a generally vertical disposition and which further is provided with a printer located therein which imprints only the upper portion of the inserted vertically disposed envelope, which imprinted and inserted envelope then falls

into an underlying vault through a slot in the vault top normally covered by a trap door. By reason of this invention, particularly the utilization of a unit which receives the deposited envelope in only a vertical position

5 and a printer which imprints the inserted envelope in only the upper portion thereof, coins in the envelope, under the weight of gravity, fall to the bottom thereof to a point below the printer, and when so located, do not interfere with the imprinting operation.

10 An advantage of this invention is that it places absolutely no reliance on the customer for proper operation, such as requiring the customer to insert the coins in the envelope in a predetermined manner or to insert the envelope into the depository in any specific fashion.

15 A satisfactory imprint of date and deposit number will be obtained regardless of whether the customer inserts the envelope in upside down, rightside up, frontwards or backwards, and irrespective of the manner in which the coins are loaded into the envelope. Since the receptacle and transfer unit into which the envelope is inserted can only receive an envelope which is vertically disposed, and since all coins fall to the bottom of the envelope below the level of the printer, there is no possibility of the customer inserting the coins into the envelope, or the envelope into the unit, in a manner which will prevent a proper imprint. The invention also does not require a specially constructed envelope. It is only essential that the envelope fit into the combined receptacle and transfer unit, and have a height which

20 at least equals the distance the printer is spaced above the trap door upon which the lower edge of the inserted envelope is supported.

The foregoing and other advantages and features of the invention will become more readily apparent from 35 a detailed description thereof taken in conjunction with the drawings in which:

FIG. 1 is a perspective view of an automated banking station incorporating the depository of this invention;

40 FIG. 2 is a perspective view, partially cut-away and exploded, of the item receptacle and transfer unit which constitutes one of the components of the depository of this invention;

FIG. 3 is a right side elevational view of the item receptacle and transfer unit;

45 FIG. 4 is a cross-sectional view taken along line 4—4 of FIG. 3;

FIG. 5 is a cross-sectional view taken along line 5—5 of FIG. 3;

50 FIG. 6 is a cross-sectional view taken along line 6—6 of FIG. 3; and

FIG. 7 is a schematic logic circuit diagram of one form of controller for the moving elements of the item receptacle and transfer unit.

55 FIG. 8 is a flow chart, in block diagram format, of the operational sequence of the controller of FIG. 7;

With reference to FIG. 1, a depository 10 embodying the principles of this invention is shown incorporated in an automated banking station 12 which, in addition to the depository for receiving and storing deposits of valuables such as money in the form of currency, checks and/or coins, also includes apparatus for dispensing money to properly authenticated banking customers. The automated banking station 12 has a cabinet 14 enclosing all components thereof, including the depository 10 and any money dispensing apparatus which may also be provided. A control panel 14-1, constituting the front of the automatic banking station cab-

inet 14, is equipped with the various controls necessary for operating the depository 10 and any money dispensing equipment provided in the automated banking station 12. Typically, the control panel 14-1 includes a slot 14-2 for receiving an identification card 15 issued to customers of the bank entitled to utilize the depository 10 and/or money dispensing apparatus incorporated in the automated banking station 12.

As best depicted in FIG. 1, the depository 10 is located within the automated banking station 12 in one corner thereof and includes a vault 16, and a combined receptacle and transfer unit 17 which temporarily stores a deposit item D to be imprinted with data to be described before transferring it to the vault 16 below. The combined receptacle and transfer unit 17 is provided with a door 18 to facilitate insertion of the deposit D, such as an envelope containing currency and coins, into an interior cavity 17-8 thereof having an open bottom 17-7 normally blocked by a trap door 20 (shown in FIGS. 2-6). Within this cavity 17-8, the deposited envelope D is imprinted with appropriate information, such as the date and a deposit reference number, which may also be printed on a receipt issued the depositor as evidence of his deposit. Following imprinting of a deposited envelope D, which occurs only after the door 18 has been closed following insertion of the envelope into the combined receptacle and transfer unit 17, the trap door 20 (shown in FIGS. 2-6) opens, allowing the deposited and imprinted envelope to fall downwardly under the weight of gravity from the cavity 17-8 of the combined receptacle and transfer unit 17 into the vault 16 via a transfer slot 22 formed in the vault top 24 which underlies the open bottom 17-7 of the receptacle and transfer unit.

Access to the interior of the vault 16 for removal of accumulated deposits stored therein is provided by an access door 23 formed in the side 26 of the vault. The access door 24 is provided with a suitable combination lock 25 and handle 27. The vault 16, including access door 23 with combination lock 25 and handle 27, is conventional in all respects except that a transfer slot 22 has been formed in the top 24.

The combined receptacle and transfer unit 17, considered in more detail in connection with FIGS. 2-6, includes a housing 30 having spaced parallel, vertical side walls 17-1 and 17-2 located on opposite sides of the transfer slot 22 formed in the vault top 24, a vertical rear end wall 17-3, an open vertical front 17-5 which is selectively closable by the door 18, a horizontal top 17-6 and the open horizontal bottom 17-7. Co-operating with the open bottom 17-7 of the combined receptacle and transfer unit 17 is the trap door 20 which is movable, by a motorized actuator 42 in a manner to be described, between a blocking position wherein its upper surface 33 underlies the open bottom 17-7 and an unblocking position laterally displaced from the open bottom 17-7. The side walls 17-1 and 17-2, rear and front ends 17-3 and 17-5, top 17-6 and open bottom 17-7 combine to define cavity 17-8 which is both narrow and vertical. With the cavity 17-8 so configured, a flat deposit item D, for example, an envelope containing currency and coins, when inserted into the cavity via open front 17-5, will be supported therein in only a generally vertically disposed position, with the lowermost extremity or edge D-1 thereof supported on the upper surface 33 of the trap door 20. When so supported, money in the deposit envelope D in the form of

coins C will, under the weight of gravity, fall to the bottom D-1 of the envelope.

Mounted proximate the side wall 17-1 is a printer 35 having a print head 36 communicating with-the-cavity 17-8 via an opening 34 formed in side wall 17-1. Co-operating with the print head 36 is a platen assembly 37 mounted proximate the housing wall 17-2 at a point opposite the printer 35. The platen assembly 37 includes a horizontally movable platen 38 which projects through an opening 39 in side wall 17-2 such that when actuated by solenoid 40 it moves horizontally across the cavity 17-8 toward the print head 36 to imprint, on the flat imprint-receiving surface of the flat deposit envelope D located therebetween, the information contained in print head 36. The openings 34 and 39 in side walls 17-1 and 17-2 are vertically spaced above the housing open bottom 17-7 a distance sufficient to insure that any coins C in the bottom of the deposit envelope D will be located below the point where the print head 36 and platen 38 contact the deposit envelope in the course of imprinting it. This insures that the imprinting process will not be impeded and the imprint rendered partially or completely illegible by the presence of coins in the deposited envelope at the point where the imprint is made. Coins, if present in the region of the imprint, can produce non-uniformity in the thickness of the envelope in the region thereof receiving the imprint, causing non-uniform contact between the print-receiving surface of the envelope and the character-bearing surface of the print head, in turn producing an imperfect imprint on the envelope.

The open front end 17-5 of the combined receptacle and transfer unit 17 is selectively blocked and unblocked by the door 18 which is generally in the form of an elongated panel. The upper edge of the door 18 is pivotally mounted by a horizontal hinge pin 45 to a hinge pin mounting block 46. The hinge pin mounting block 46 is secured to the upper front corner of the housing 17 via suitable fasteners (not shown) which secure the block 46 to tabs 47 and 48 which extend horizontally from the housing side walls 17-1 and 17-2, respectively. Plates 43 and 44 secured to side walls 17-1 and 17-2 adjacent the front end 17-5 abut the ends of the hinge pin 45 to prevent axial movement thereof, and also serve as side jams for door 18. The hinged door 18 is movable between a vertical, or closed, position shown in FIG. 3 in which the deposit insertion opening 17-5 is blocked or closed, and a generally horizontal position shown in FIG. 1 in which the insertion opening 17-5 is unblocked to permit an envelope D to be inserted into the cavity 17-8 via insertion opening 17-5.

Extending from the rear surface of the door 18 into the cavity 17-8 adjacent the bottom thereof is a block 18-1 having a vertical recess or hole 18-2 therein. The recess 18-2, when the door 18 is in its closed position shown in FIG. 3, overlies a vertical bore 50 formed in a bridging element 51 which is integral with and spans the housing sides 17-1 and 17-2 in the lower front region thereof. A housing door locking pin 52 is vertically slidable in the bore 50 via an actuating mechanism, to be described, between an upper position shown in FIG. 3 in which the upper end of the lock pin 52 seats in the recess 18-2 of the door block 18-1, locking the door 18 in the closed position, and a lower position (not shown) in which the upper end of the lock pin 52 is withdrawn

from the recess 18-2 in door block 18-1 to unlock the door 18.

The housing door lock pin actuator, considered in more detail with reference to FIG. 3, includes a solenoid 55 mounted to housing side wall 17-2. Solenoid 55 has a horizontally disposed armature 56 which is biased to a rearward position by a compression spring 57 located between an enlarged head 56-1 of the armature 56 and the rear end 55-1 of the solenoid. Secured to the front end of the armature 56 is a vertically slotted yoke 56-2 which pivotally mounts via horizontal pin 56-3 one end of a link 59, the other end of which is pivotally connected via transverse pin 58 to the upper end of an angled link 60. Extending generally perpendicularly from the lower end of angled link 60 and rigidly fixed with respect thereto is a short link 62 having a rounded free end 62-1 which is pivotally received in a horizontal cross slot 64 formed in the lower portion of the vertically shiftable lock pin 52. The links 60 and 62 effectively form a bellcrank in the sense that these links pivot about a horizontal axis constituted by a pin 65 anchored in bridging element 51. When the solenoid 55 is de-energized and the armature 56 urged to its rearward position by the spring 57 as shown in FIG. 3, links 59, 60 and 62 assume the position shown in FIG. 3 to position the lock pin 52 in its upper position with the upper end thereof in recess 18-2 of door lock 18-1 to lock the door 18 in its closed position. Upon energization of the solenoid 55, the armature 56 is urged forwardly, that is leftwardly as viewed in FIG. 3. Leftward movement of the armature 56, via link 59, pivots link 60 counterclockwise about pin 65 in turn pivoting link 62 counterclockwise to lower lock pin 52 such that the upper end thereof retracts from the recess 18-2 formed in door block 18-1 of door 18, effectively unlocking the housing door.

An electrical switch 70 having a vertically movable switch actuator 71 projecting from the top thereof is mounted to housing side wall 17-1 at a point such that switch actuator 71 is actuated by the lower edge of link 60 when the solenoid armature 56 has moved to the lock position shown in FIG. 3. In this way, switch 70 can be used as a sensor to detect when the housing door locking pin 52 is in its lowermost position and the housing door 18 unlocked and/or when the locking pin 52 is in its uppermost position and the door 18, if closed, in a locked position.

A switch 72 having a horizontally moving switch actuator 73 is mounted to housing side wall 17-2 and cooperates with the depending leg 74-1 of a horizontally movable L-shaped bar 74 whose horizontal leg 74-2 is fixed to the end 75-1 of a rod 75 horizontally slidably in a bore 76 formed in hinge pin mounting block 46. The free-end 75-2 of rod 75 is rounded and engages a cam 77 formed integral with the upper portion of the door 18. Cam 77 rotates in a clockwise direction about hinge pin 45, as viewed in FIG. 3, when the door 18 moves from its closed position to its open position. Clockwise movement of the cam 77 from the position shown in FIG. 3 as a consequence of opening the door 18 urges the rod 75 rearwardly, that is, rightwardly as viewed in FIG. 3, which in turn shifts L-shaped bar 74 rightwardly. Rightward movement of the bar 74 actuates switch arm 73 of switch 72 making it possible to sense when the housing door 18 is fully closed and/or partially or completely open.

The print head assembly 35, which may take any conventional form, has a print head 36 extending into the cavity 17-8 via opening 34 in a manner described earlier, such that embossed characters representative of the desired information to be imprinted upon the vertically disposed envelope located in cavity 17-8 are presented in a vertical plane flush with the inner vertical surface of housing wall 17-1. Preferably the embossed characters included in the print head 36 would provide an imprint of the current date as well as a deposit reference number, which may also be imprinted on a receipt issued to the customer following a deposit. The reference number may be the depositor's account number as read from a card 15 inserted into the automated banking station 12 via slot 14-2 and/or a serial number generated in the print head assembly 35 which indexes one numerical unit following each deposit such that successively increasing serial numbers are imprinted on successive deposit envelopes inserted into the cavity 17-8 as a consequence of successive deposit operations. A print head assembly manufactured by Practical Automation Inc., Trap Falls Road, Shelton, Conn. 06484, including components designated Models CM10P/Z/5 (wheel "A") and PCR-9, has been found to operate satisfactorily.

The platen assembly 37, as indicated, includes a horizontally movable platen 38 actuated by a platen solenoid 40. The platen 38 has a vertical planar resilient layer 38a such as hard rubber, and a rigid backing plate 38b, preferably formed of metal to which the resilient layer 38a is laminated. Secured to and extending horizontally from the outer surface of platen backing plate 38b is an elongated generally flat, horizontally disposed movable slide member 80, the inner end 81 of which is bent downwardly and secured to the outer central portion of the backing plate 38b as seen best in FIGS. 2, 4 and 5. The movable slide member 80 has a vertical cross-section which is in the form of an inverted U-shape, having downturned margins 82 and 83 integral with the longitudinal edges of the slide member 80. Stationarily mounted to the housing side wall 17-2 and extending perpendicularly outward therefrom is an elongated guide block 84. The stationary guide block 84 has its inner end formed integral with a U-shaped bracket 86 which is secured to housing side wall 17-2 by any suitable means, such as by fasteners (not shown). Extending upwardly from the outer forward corner of the stationary guide block 84 is a tab or stop 87. The movable slide member 80 slidably seats on the upper surface of the stationary guide block 84 with the downwardly extending margins 82 and 83 of the slide member 80 disposed exteriorly and parallel to the longitudinal edges of the stationary block 84, limiting movement of the slide member 80 to a direction parallel to the length of the block 84.

Inward movement of the slide member 80, and hence of the platen 38, is produced by a toggle mechanism 89 actuated by the solenoid 40. The toggle mechanism 89 consists of three links 90, 91 and 92 which are pivotally connected to each other by a common pin 93 which passes vertically through the links. The other ends of links 90, 91 and 92 are pivotally connected to the movable slide member 80, the movable solenoid armature 40-1 and the stationary outer end of the guide block 84 by pins 95, 96 and 97, respectively. A tension spring 94 connected between tabs 98 and 99 secured to pins 96 and 97, respectively, biases the links 90, 91 and 92 of

the toggle mechanism 89 and the armature 40-1 of the solenoid 40 to the normal position shown in FIG. 4. In this position, the slide 80 which is movable horizontally in a direction perpendicular to the housing wall 17-2, is in its outermost, or retracted, position. As shown in FIG. 4, in this retracted position, the inner vertical surface of the resilient layer 38a secured to platen backing plate 38b is flush with the inner vertical surface of the housing wall 17-2.

Upon energization of the solenoid 40, the armature 40-1 moves horizontally in a rearwardly direction, that is, rightwardly as viewed in FIG. 4, in turn shifting the toggle link 91 rightwardly. Movement of the toggle link 91 in the manner indicated advances the pin 93 rightwardly, since pin 97 is mounted to the outer end of stationary guide block 84 and does not move. Movement of pin 93 in the manner indicated causes the pin 95, and hence the slide member 80 having mounted to it the platen 38 at its inner end, to move into the cavity 17-8 (upwardly as viewed in FIG. 4). Movement of the platen 38 in this manner advances the platen across the cavity 17-8 toward the print head 36. Continued advancement of the platen 38 in the manner indicated under the action of the solenoid 40 causes a vertically disposed envelope D inserted in the cavity 17-8 to become sandwiched between the vertical surface of resilient laminate 38a and the vertical character plane of the print head 36 to produce an imprint on the flat, vertically disposed print-receiving surface of the envelope. Upon de-energization of the solenoid 40, the spring 94, which is in its extended position when the solenoid 40 is energized, returns the toggle link 91 to the normal position shown in FIG. 3, which in turn retracts the slide 80 to the normal position shown in FIG. 3 wherein the inner vertical surface of the resilient platen layer 38a is flush with the inner vertical surface of the housing wall 17-2. The end 100 of the link 92 abuts the vertical stop 87 extending upwardly from the outer end of guide block 84 when the link 92 rotates to a position perpendicular to the housing wall 17-2, which occurs when the solenoid 40 is energized, to prevent the pin 93 from moving "over center," that is, to a point rightwardly, as viewed in FIG. 4, of an imaginary line joining pins 95 and 97.

The trap door 20 is mounted for horizontal lateral sliding movement between a position blocking housing bottom 17-7 and a position outboard of the housing, that is, below the housing as viewed in FIG. 4. The mounting structure for the horizontally sliding trap door 20 includes a guide block 102 secured to the bottom surface 103 of the trap door 20 proximate the forward end thereof. Guide block 102 has a horizontal slot 105 formed in the front vertical surface 106 thereof. Guide slot 105 formed in block 102 receives a stationary horizontally rearwardly extending lip 104 formed integral with the upper edge of a vertical plate 107 secured by fasteners 108 to the rear vertical surface of a leg 109 formed integral with a horizontal leg 110 which together form an angle bracket 111. Horizontal leg 110 of the angle bracket 111 is fastened to the bridging element 51 of the housing 17. Stationary horizontal guide ledge 106 supports the forward end of the trap door 20 for horizontal sliding movement via guide block 102 mounted for movement with the forward portion of a trap door 20.

Secured to the upper surface 33 of the rear portion of the trap door 20 are two guide blocks 115 and 116

having horizontal bores 115-1 and 116-1 therethrough which are coaxial and disposed perpendicular to housing walls 17-1 and 17-2. Slidably positioned within bores 115-1 and 116-1 of guide blocks 115 and 116 is 5 a stationary guide rod 117 which is horizontally disposed perpendicular to housing walls 17-1 and 17-2. Guide rod 117 has its opposite ends anchored in rearwardly extending ears 118 and 119 integral with opposite ends of a horizontally disposed bracket 120 10 mounted to the housing wall 17-3 along the lower portion thereof. Thus, the rear end of trap door 20 is constrained to horizontal sliding movement by the stationary horizontal guide rod 117 slidably engaging bores 115-1 and 116-1 of guide blocks 115 and 116 secured 15 to the upper surface 33 of the trap door 20 at the rear end thereof.

The trap door motorized actuator 42 includes a motor 125 having a horizontal forwardly extending rotatable shaft 126. The motor 125 is stationarily 20 mounted to the housing 17 via an L-shaped bracket 127, the lower leg of which mounts to the face of the motor while the upper leg mounts via a fastener 129 to a horizontally rearwardly extending bracket 128 formed integral with the housing 17. Fixed for rotation 25 with the free end of the motor shaft 126 is a link 130, the free end of which is provided with a roller 131 rotationally secured thereto via a pin 132. The roller 131 is positioned for vertical sliding movement in a slot 133 30 formed in a vertical plate 134 the lower end of which is secured to the upper surface 33 of the trap door 20 between the guide rod 117 and vertical rear wall 17-3 of the housing 17.

Upon energization of the motor 125 and rotation of 35 the motor output shaft 126, the link 130 rotates with the shaft 126 causing the roller 131 to move through an arc of approximately 180° from the position shown in solid lines in FIG. 6 to the position shown in dotted lines in FIG. 6. In the course of this rotation of link 130, 40 the plate 134, and hence the trap door 20, translates laterally to the left, as viewed in FIG. 6, from a closed position wherein the plate 20 blocks housing opening 17-7 to an open position wherein the plate is displaced laterally of the housing opening 17-7 permitting the 45 housing cavity 17-8 to communicate with the interior of the vault 16 via the transfer slot 22 which in use underlies the open bottom 17-7 of the housing. Closure of the trap door is accomplished by rotating the motor shaft 126 180° in either direction, which repositions the roller 131 from the dotted line position shown in FIG. 6 corresponding to the open trap door condition to the solid line position shown in FIG. 6 corresponding to the closed trap door condition.

To de-energize the motor 125 after the vertical plate 55 134 and hence the trap door 20 have moved to the open and closed positions, limit switches 140 and 141, respectively, are provided. Limit switch 140 has a movable actuator 140-1 which is actuated by edge 142 of plate 134 when the plate and, hence, the trap door 20 60 have moved to the open position. Actuation of switch arm 140-1 by plate edge 142 is effective to de-energize the motor 125 to terminate further opening motion of the trap door. Switch 141 is provided with a movable actuator 141-1 which is actuated by the vertical edge 65 143 of plate 134 when the plate 134 and, hence, the trap door 20 have moved to the closed position. Actuation of switch arm 141-1 terminates energization of the

motor 125 to terminate closing motion of the plate 134 and, hence, of the trap door 20.

To lock the trap door 20 in the closed position, that is, in a position underlying the open housing bottom 17-7 and overlying the transfer slot 22 formed in the vault top 24, a solenoid 150 and lock pin 152 are provided. The solenoid 150 is mounted to the housing wall 17-2 in a position such that its armature 150-1 is vertically disposed. Connected to the lower end of the solenoid armature 150-1 is the upper end of the lock pin 152. The lower end of the lock pin 152 overlies an aperture or recess 153 formed in the forward end of the trap door 20. Under normal conditions when the solenoid 150 is de-energized, the armature 150-1 is in its lower extended position shown in FIG. 3, with the result that the lock pin 152 has its lower end positioned in recess 153, formed in the forward end of the trap door plate 20. Upon energization of the solenoid 150, the armature 150-1 is drawn upwardly to retract the lower end of the lock pin 152 from within the recess 153 formed in the lower end of the trap door 20, as a consequence of which the trap door 20 is unlocked.

In practice it has been found advantageous to construct the combined receptacle and transfer unit 17 as a sub-assembly separate and distinct from the vault 16. In this way, by merely providing the top 24 of a conventional vault with a transfer slot of the type shown in FIG. 1 and identified as slot 22, and by then securing a combined receptacle and transfer unit 17 to the upper surface of the vault in which the transfer slot is formed, with the open bottom 17-7 of the unit 17 overlying the transfer slot 22, the depository of this invention is readily fabricated. Thus, with a combined receptacle and transfer unit 17 of the type described, a conventional vault can be easily modified such that when combined with the receptacle and transfer unit 17 it forms a depository constructed in accordance with this invention.

In operation, upon insertion of an authorized identification card 15 into the control panel slot 14-2 of the automated banking station 12, an electrical signal is generated which is effective to energize the normally de-energized solenoid 55. Energization of solenoid 55 is effective, in a manner described earlier, to retract the lock pin 52 from the recess 18-2 formed in block 18-1 of door 18, unlocking the housing door and thereby enabling the bank customer to move it from the closed vertical position shown in FIG. 3 to the open horizontal position shown in FIG. 1. With the housing door unlocked and open, a depository envelope D can be inserted into the housing cavity 17-8 wherein it is positioned in a generally vertical disposition with its flat imprint receiving surface generally vertically disposed proximate the print head 36.

Opening of the housing door 18 rotates the cam 77 from the position shown in FIG. 3 to, in a manner described previously, actuate switch 72. With switch 72 actuated, a signal is provided indicating that the door 18 is open. This signal, in combination with a signal provided by switch 141 indicating that the trap door 20 is closed, is used to prevent the motor 125 from becoming energized to open the trap door. Thus, as long as the door 18 is open, the trap door actuator 42 is disabled and since the trap door is in the closed position, access to the vault cannot be had via the open door 18.

Closure of the door 18 following insertion of a depository envelope D into the cavity 17-8 activates the

switch 72 causing the solenoid 55 to become de-energized. With solenoid 55 de-energized, the compression spring 57, in a manner described, effectively causes the lock pin 52 to move upwardly to its locking door position in engagement with the recess 18-2 in slot 18-1 secured to door 18. Switch 70 senses that the locking pin 52 is in its elevated locking position and as a consequence generates an electrical signal which is used to energize the printer solenoid 40 which, in a manner described earlier, causes the platen 38 to be urged toward the print head 36 and imprint the envelope vertically disposed therebetween. Upon completion of the imprinting cycle, the solenoid 150 is energized to elevate lock pin 152 and unlock trap door 20. Additionally, motor 125 is energized to open the trap door 20. Upon arrival of the trap door at the fully open position, the switch 140 is actuated to de-energize the motor 125. With the trap door 30 in its open position, the imprinted deposit envelope D in the housing cavity 17-8 drops under the force of gravity into the vault 16 via the transfer slot 22 formed in the vault top 24. The motor 125 is again energized, following a suitable predetermined delay designed to allow the envelope D to enter the vault 16, and the trap door 20 is moved to its closed position overlying transfer slot 22. When the trap door has reached the fully closed position, switch 141 is actuated to de-energize the motor. Additionally, the trap door lock pin solenoid 150 is de-energized, allowing the lock pin 152 to drop into the recess 153 formed in the forward end of the trap door 20, locking the trap door in the closed position.

With reference to FIGS. 7 and 8, a description of the operational sequence of the various elements of the item receptacle and transfer unit 17 is now provided. In the stand-by mode of operation, that is, when the device is awaiting usage by a customer, the door 18 is in the closed position, with the actuator 73 of switch 72 depressed, closing the contacts of this switch, providing a logical 1 signal level on line 72(a). Additionally, the door 18 is locked by virtue of pin 52 being in its upward position as a consequence of solenoid 55 being de-energized and its armature 56 urged rightwardly by spring 57. Since the solenoid 55 is de-energized, the actuator 71 of switch 70 is in its depressed position, closing the contacts of this switch, providing a logical 1 signal level on line 70(a). In the stand-by condition, the trap door 33 is also in its closed position, underlying cavity 17-8, as depicted in FIGS. 5 and 6. The trap door motor 125, which drives the trap door 33 between its open and closed positions, is de-energized, and the actuator 141-1 of limit switch 143 is tripped, closing the contacts of this switch, providing a logical 1 signal level on line 141(a). The actuator 140-1 of switch 140 is not tripped, allowing the contacts of this switch to remain open, providing a logical 0 signal level on line 140(a). Additionally, the trap door 33 is locked by reason of the pin 152 being in its lower position as a consequence of solenoid 150 being de-energized. Phototransducers PC-1, PC-2, PC-3, and PC-4 (FIGS. 3-5 and 7) are irradiated by suitable aligned light sources S₁, S₂, S₃, and S₄, assuming cavity 17-8 is empty, providing logical 0 signals on their respective output lines PC-1(a), PC-2(a), PC-3(a) and PC-4(a), respectively. An eight-position binary ring counter 200 with output terminals 0, 1, 2, 3, 4, 5, 6 and 7 is in its stand-by, or reset, condition with a logical 1 signal level at output terminal 0, and logical 0 signal levels at the remaining output ter-

minals. Ring counter 200 is placed in the stand-by, or reset, condition automatically at the end of a depository cycle when the counter advances from count 6 to count 7, whereupon the logical 1 output from counter terminal 7 is input via an OR-gate 201 to the reset terminal of the counter. This resets the ring counter to count 0, in which a logical 1 is present on counter output terminal 0. This logical 1 signal is input to the printer 35 via line 199, to reset all print wheels thereof to zero. Alternatively, the ring counter 200 can be reset by activation of a manual reset button 202, which when actuated applies a logical 1 signal to the reset terminal of the counter via OR-gate 201.

In operation, upon insertion of a card 15 in slot 14-2 of the banking unit 14, and assuming the inserted card is valid, a logical 1 signal is applied to line 203. The logical 1 signal on line 203 is input to AND-gate 204, the other input terminal of which has applied to it a logical 1 signal as a consequence of the ring counter 200 being in the reset state with a logical 1 at its counter output terminal 0. With logical 1 signals on both input lines to AND-gate 204, a logical 1 output is provided on the output line thereof, which in turn is input to an OR-gate 205 providing on OR-gate output line 206 a logical 1 signal which is applied to a clock input of the ring counter 200, advancing the ring counter from count 0 to a count 1. With the ring counter 200 at count 1, a logical 1 level is present on ring counter output terminal 1.

The logical 1 signal at ring counter output terminal 1 is applied to an AND-gate 212. Another input to AND-gate 212 is provided by an AND-gate 210 which is responsive to switch 72 controlled by door 18 and lock pin switch 70. If the door 18 is closed and locked, logical 1 signals are applied to both terminals of AND-gate 210 via lines 72(a) and 70(a), providing a logical 1 signal from the output of AND-gate 210 to AND-gate 212. The third input to AND-gate 212 is applied via an inverter 214 from an OR-gate 209, the inputs of which are provided by phototransducers PC-1 through PC-4. Phototransducers PC-1 through PC-4 provide a logical 0 to OR-gate 208 when their respective phototransducers are not blocked by an item in the depository cavity 17-8 and provide a logical 1 on their respective output lines when their respective phototransducers are blocked by an item in the cavity. Assuming the cavity 17-8 is empty and all four phototransducers PC-1 through PC-4 are in an unblocked or clear state, logical 0's are input on all the input lines to OR-gate 209, providing a logical 0 output signal therefrom which, via inverter 214, provides a logical 1 input to AND-gate 212. With logical 1 signals on all three inputs to AND-gate 212, a logical 1 output signal is provided thereby to the door lock solenoid 55 energizing this solenoid to unlock the door. The door 18 can now be opened and an item inserted into the cavity 17-8, which will result in blocking one or more of the phototransducers PC-1 through PC-4. Once door 18 is opened, switch 72 is tripped, placing a logical 0 signal on line 72(a) which, via AND-gates 210 and 212, de-energizes door lock solenoid 55, causing pin 52 to raise. By reason of cam surface 18(a) on door 18, the door can be closed even though lock pin 52 is raised.

With an item in the cavity 17-8 and one or more of the phototransducers PC-1 through PC-4 blocked, a logical 1 signal is output from OR-gate 209 to the AND-gate 208. Assuming the door 18 has been closed

following insertion of an item in cavity 17-8, and with solenoid 55 de-energized, a logical 1 signal is applied to AND-gate 208 from the output of AND-gate 210 since logical 1 signals are input to AND-gate 210 from both switch 72 and switch 70. With logical 1 signals applied to both inputs of AND-gate 208, a logical 1 signal is output from AND-gate 208 to the AND-gate 207, the other input of which has a logical 1 applied to it from ring counter terminal 1. With logical 1 signals applied to both inputs of AND-gate 207, an output is provided from this AND-gate to OR-gate 205, which via line 206 provides a clock input to ring counter 200 to advance the counter to the count 2 position, providing a logical 1 level at ring counter terminal 2.

With ring counter 200 now in the count 2 position, a logical 1 signal is applied to the printer 35 via line 216 which sets the embossed print wheels of the printer to correspond to information provided to the printer on lines 217 from a central processing unit associated with the banking terminal. The central processing unit 218 provides on its output lines 217 signals to the printer 35 corresponding to the desired serial number and date which is to be imprinted on the deposited item.

The logical 1 output from the ring counter terminal 2 is also applied to an OR-gate 220 which provides on its output line a logical 1 signal to a 1-second timer 221, providing a 1-second duration logical 0 signal on line 222 to inhibit AND-gate 223 for 1 second. At the end of the 1-second interval established by timer 221, a logical 1 signal is again present on line 222. With a logical 1 now present on line 222, and a logical 1 signal present at ring counter terminal 2, AND-gate 223 provides a logical 1 output signal to OR-gate 205 which, via line 206, provides a clock input to the ring counter 200 to advance the ring counter to its count 3 state providing a logical 1 output at counter terminal 3.

With the counter 200 in the count 3 state, a logical 1 signal is applied to OR-gate 220 which provides on its output line to the timer 221 a logical 1 signal, providing in turn on line 222 a 1-second duration logical 0 signal. The 1-second duration logical 0 signal on line 222 inhibits AND-gate 224 for one-second during which time the logical 1 output from the ring counter terminal 3 is applied to the printer solenoid 40 to advance the platen 38 toward the print surface 36 and imprint the deposited item. At the end of the 1-second interval established by timer 221, the signal on timer output line 222 returns to a logical 1 state with the result that both inputs to AND-gate 224 are at a logical 1 level and a logical 1 is output therefrom to an OR-gate 205 which via line 206 provides a clock input to the ring counter 200 to advance the counter to a count 4 state.

With the counter 200 in a count 4 state, a logical 1 is provided at ring counter output terminal 4 which in turn is applied to AND-gate 226, the other terminal of which is connected via an inverter 227 to the trap door switch 140 via line 140(a). Assuming the trap door 33 is closed, switch 140 is de-actuated and its switch contacts open, providing on line 140(a) a logical 0 signal which, via inverter 227, provides a logical 1 input to the other input of AND-gate 226. AND-gate 226, with both inputs thereto at logical 1 levels, provides on its output line a logical 1 signal which via OR-gate 228 provides a logical 1 signal to the trap door solenoid 150, energizing this solenoid and elevating pin 152 to unlock the trap door.

The output from OR-gate 228, which is at a logical 1 level, is also input to the trap door motor 125, energizing this motor which then translates horizontally the trap door 33 from the closed position underlying the cavity 17-8 to its open position. When the trap door 33 reaches its open position, the switch 140 is actuated, closing its contacts which provide a logical 1 signal on line 140(a) which upon inversion by inverter 227 provides a logical 0 to AND-gate 226, returning the output of this AND-gate to a logical 0 which via OR-gate 228 deenergizes the motor 125 and the trap door solenoid 150.

Opening of the trap door 33 and actuation of the switch 140 also provides an input to AND-gate 230. Assuming the item deposited in the cavity 17-8 has now dropped through the slot 22 into the cavity of the vault 16, a logical 1 will be output from NOR-gate 231 since phototransducers PC-1 through PC-4 are all unblocked because the cavity 17-8 is empty. This logical 1 output constitutes the other input to AND-gate 230. With the trap door 33 in its fully open position and the cavity 17-8 empty, AND-gate 230 provides a logical 1 output to AND-gate 235 which in turn provides a logical 1 output to OR-gate 205 which, via line 206, provides a clock input to ring counter 200 to advance the ring counter to a count 5 state whereupon a logical 1 signal is output from ring counter terminal 5.

The output from counter terminal 5 is applied via OR-gate 228 to the trap door lock solenoid 150 energizing this solenoid to elevate lock pin 152 and also to the trap door motor 125 energizing this motor which then closes the trap door. When the trap door 33 has fully closed, switch 141 is tripped closing its contacts to provide a logical 1 signal on line 141(a) which is input to AND-gate 236 whose other input is also at a logical 1 level as a consequence of the ring counter being in the count 5 state. AND-gate 236 then provides a logical 1 signal on its output line to OR-gate 205 which via line 206 applies a clock input to the ring counter to advance the ring counter to the count 6 state, providing a logical 1 output signal at ring counter terminal 6.

The logical 1 signal from ring counter terminal 6 is applied via OR-gate 220 to the timer 221 providing a 1-second logical 0 level signal to AND-gate 238 disabling this AND-gate for 1 second. During the disablement of AND-gate 238 a logical 1 signal from ring counter terminal 6 is applied via line 233 to a ribbon solenoid (not shown) in the printer 35 to advance the ribbon of the printer. At the end of the 1-second interval provided by timer 221, output line 222 reverts to a logical 1 state. At this time, both inputs to AND-gate 238 are at a logical 1 level, providing from this AND-gate a logical 1 signal to OR-gate 205, which via line 206 provides a clock input to ring counter 200 advancing the ring counter to a count 7 state. With the ring counter 200 in the count 7 position, a logical 1 level is applied at counter terminal 7 which, via OR-gate 201, is applied to the counter reset input to reset the counter to its count 0, or reset, state with a logical 1 at counter terminal 0. The logical 1 at counter terminal 0 resets the printer 35 via line 199. The controller is now in its stand-by state.

In practice, it has been found that on occasion if the deposited envelope has not had its flap properly sealed, the flap will engage the inside wall of the cavity 17-8 and prevent the deposited envelope from falling

through slot 22 into the underlying vault 16 when the trap door 33 is momentarily opened. If desired, and to insure that the cavity 17-8 will be emptied following deposit of an envelope which has an improperly sealed flap, the circuit of FIG. 7 may be suitably modified in a manner well known to those skilled in the art to operate such that following closure of the trap door 33 if one or more of the phototransducers PC-1 through PC-4 is blocked, the imprinting platen 38 will cycle three or four times in rapid succession. This will be effective to press the unsealed envelope flap against the body of the envelope insuring that it will drop into the underlying vault 16 through the slot 22 when the trap door 33 is again momentarily opened following the multiple and rapid cycling of the platen 38.

Having described our invention, we claim:

1. A depository for receiving and storing items having a generally flat shape with a flat imprint receiving surface thereon comprising, in combination:

a vault for storing received items, said vault having an item transfer opening through which an item can be transferred for storage in said vault, said vault including an access opening with a door to facilitate selective access to said vault for removal of items stored therein;

a housing disposed above said vault, said housing including spaced generally vertically disposed side walls, a top wall, a rear wall and a bottom opening communicating directly with said transfer opening, said transfer opening being at least as large as said bottom opening;

said housing having a manually accessible insertion opening selectively closable with a manually accessible housing door disposed at the opposite end of said housing from said rear wall;

said housing having a generally horizontally slideable trap door mounted for movement between a blocked and an open position, said trap door comprising a floor for said housing when disposed at its blocked position to prevent access through said transfer opening to said vault and permitting items to freely fall from said housing through said bottom opening and said transfer opening directly into said vault when said trap door is disposed at its open position;

said side walls, said top wall, said rear wall, and said trap door at its blocked position collectively comprising a receptacle for receiving flat items manually inserted directly into said receptacle through said insertion opening and temporarily storing said flat items in a generally vertical position with the flat surfaces of the item disposed generally parallel to said side walls;

item detector means disposed within said item receptacle to detect the presence of an item said item receptacle, said item detector producing an item present signal when an item is detected within said item receptacle;

a door closed detector for detecting when said housing door is closed and producing a door closed signal;

control means responsive to said door closed signal and said item present signal to sequentially generate a lock door signal, a printer actuate signal, and an open trap door signal;

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a selectively operable door lock operative in response to said lock door signal to lock said housing door to prevent access to said housing;
a printer disposed proximate one said side wall for imprinting one said flat surface of an item in said receptacle, said printer being actuated by receipt of said printer actuate signal, said printer being disposed at a point above said trap door; and
a trap door actuator operable in response to said open trap door signal to slide said trap door from 10

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its blocked to its open position and then back to its blocked position.

2. The depository of claim 1 wherein:
said flat items are adapted to receive coins, said coins being movable within said item so as to rest within said item adjacent said trap door and said printer is disposed a sufficient distance above said trap door so that said coins will not interfere with the operation of said printer.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,866,235
DATED : February 11, 1975
INVENTOR(S) : Robert W. Maynard et al

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 6, line 61, change "thorugh" to --through--.

Column 11, line 42, change "208" to --209--.

Column 14, line 57, insert "within" between the words "item" and "said".

Signed and Sealed this
thirtieth Day of September 1975

[SEAL]

Attest:

RUTH C. MASON
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents and Trademarks